TRITIUM DYNAMICS IN LARGE FISH – A MODEL TEST

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Tritium (^{3}H) is a weak beta emitter (E_{max}=18 keV) and is released from some nuclear facilities in relatively large quantities. There is a specific interest for tritium because it enters straight into the living organisms as its stable analogue (hydrogen). Tritium can represent a key radionuclide in the aquatic environment, in some cases, contributing significantly to the doses received by aquatic non-human biota and by humans due to aquatic releases. Moreover, aquatic organisms are occasionally exposed to elevated tritium concentrations in water when tritium is released accidentally to aquatic ecosystems. However, the rates of uptake of tritiated water (HTO) and formation of organically-bound tritium (OBT) are currently not very well understood. Recently, the necessity to have a robust assessment of tritium routine and accidental risk emissions for large nuclear installations increased the interest in the topic. In the past, the experimental data for OBT biological turnover rates in fish have been only reported for a small goldfish and a juvenile rainbow trout.

In the present paper, the recent experiments concerning tritium transfer in minnow and adult rainbow trout are described. The experiments give the OBT dynamics in fish fed with clean food but living in contaminated water (HTO) or living in clean water and fed with tritiated food. The updated model concerning the dynamics of tritium transfer in aquatic food chain (AQUATRIT model) developed by the authors is applied and tested for these experimental data. The model predicts the experimental data with a factor 2 to 3 and the potential improvements of the model are discussed. The present model results emphasize that in field conditions, the major factors influencing the OBT biological loss rate are the temperature and the prey availability while, the OBT uptake is mainly influenced by the fish growth rates.

The main goals of this paper are to enhance the robustness of aquatic models for tritium risk assessment and to fulfil the knowledge gap for aquatic pathways in environment.